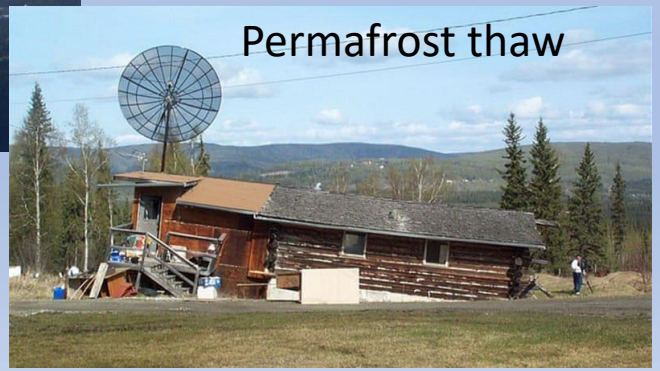
Arctic Urban Risks and Adaptations (AURA): a co-production framework for addressing multiple changing environmental hazards

Respond To Risk

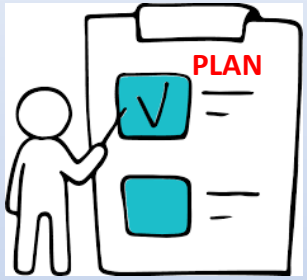
PI: Jennifer Schmidt, University of Alaska Anchorage
https://www.respondtorisk.com



Alaska Fire Science Consortium Meeting
Spring 2020

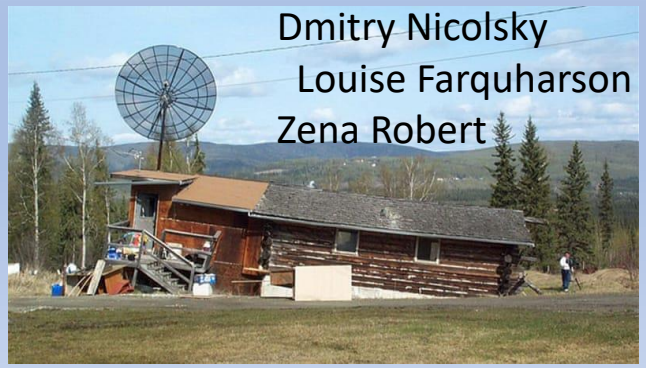
Team

Jim Powell



Matt Berman
Kevin Berry
Toby Schwoerer
Brett Jordon

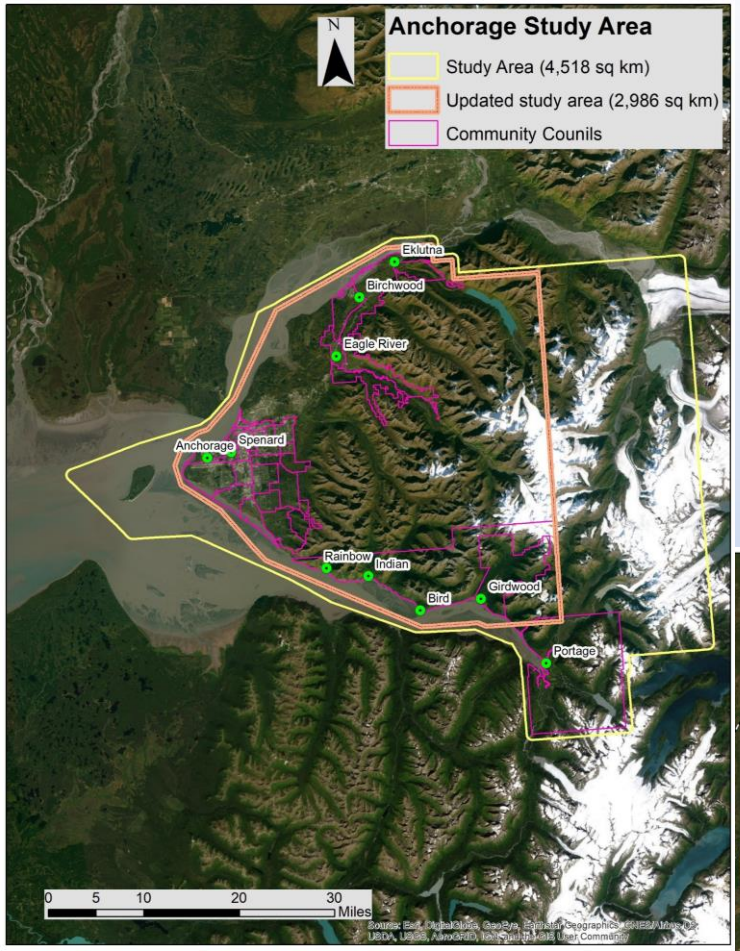
Economists

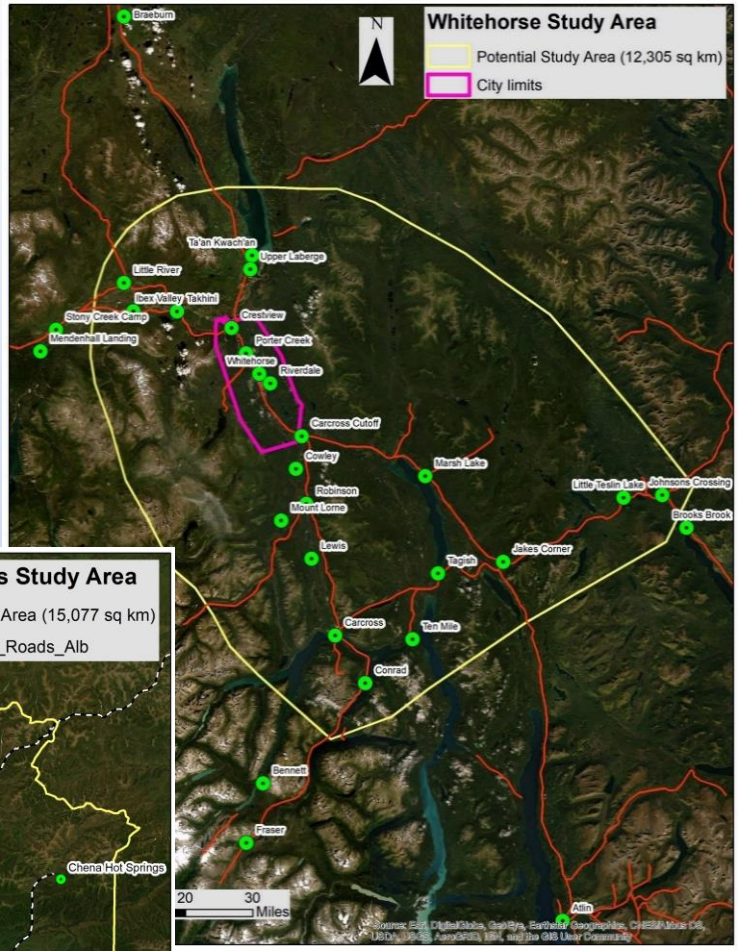


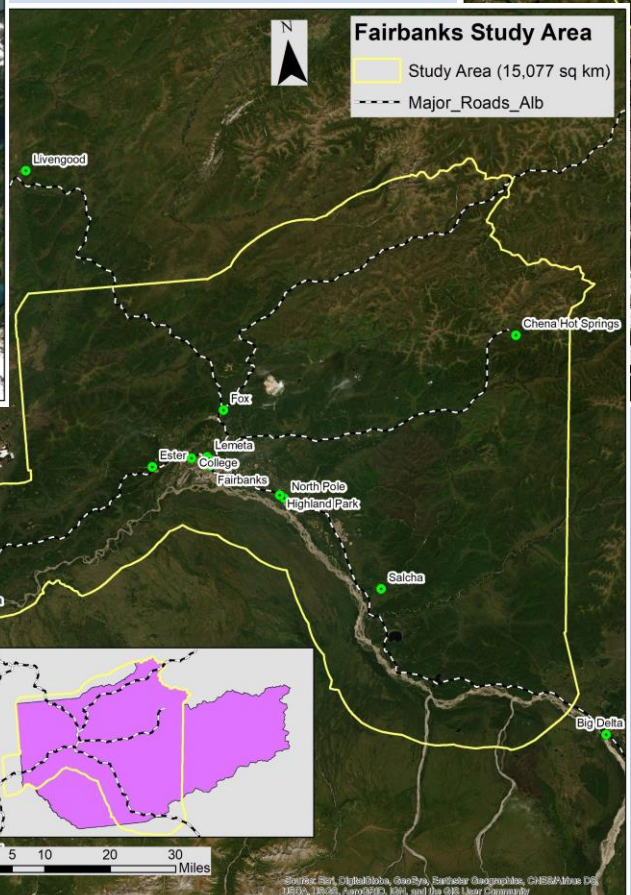
Partners

Communities
Cold Climate Research Center
Scenarios Network for Alaska and Arctic Planning

Study Areas





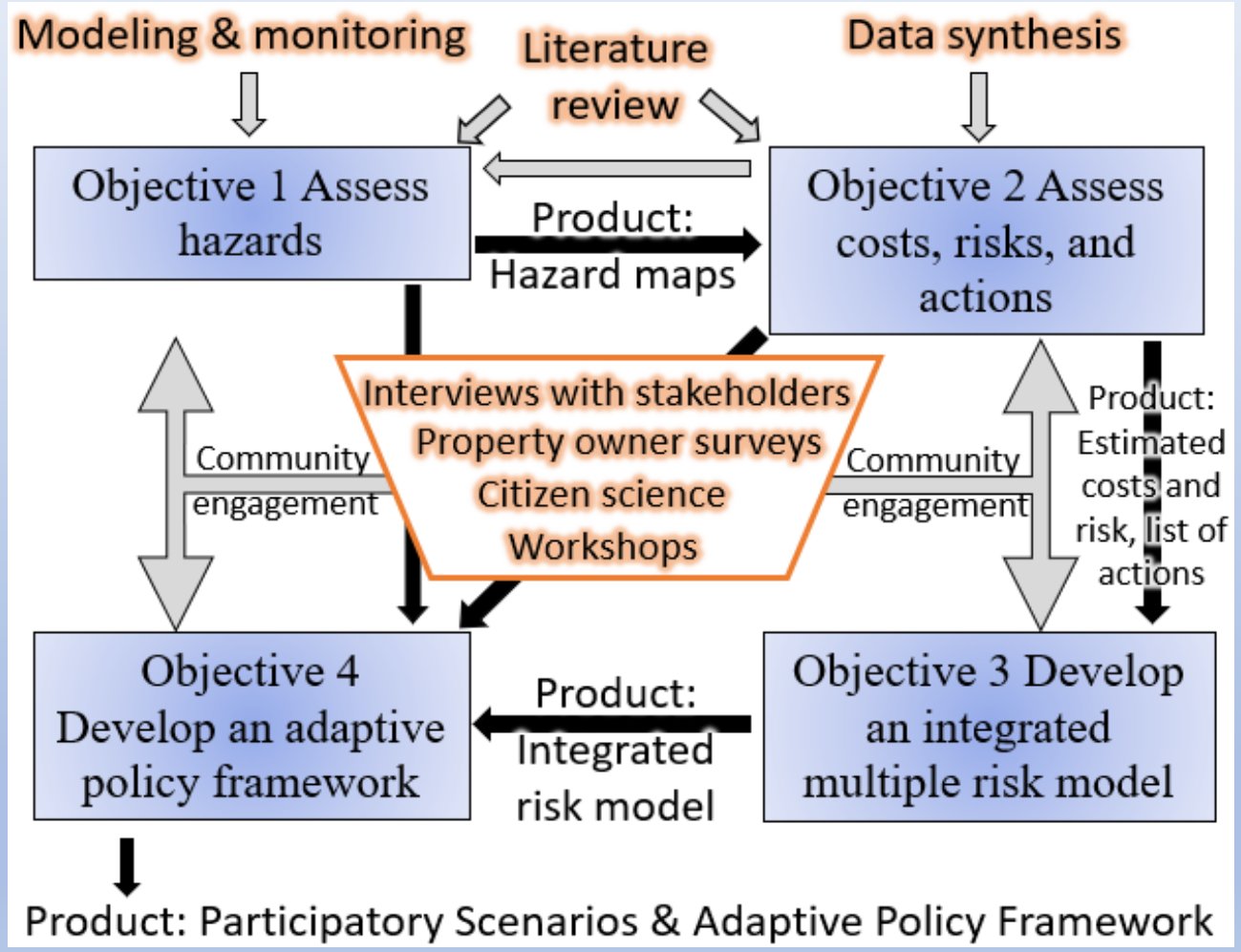


4-year project
Oct. 2019 – Sept. 2023

Goals

- To better understand how thawing permafrost, wildfire, and rain-in-winter hazards are changing
- Understand and assess the risks and costs associated with the hazards
- Develop and evaluate measures that could enhance the capacity of local residents and governments to respond effectively as climate continues to change
- Work together to identify other areas of overlap to facilitate synergistic activities between academia and communities

The process


Modeling & monitoring
Literature review
Data synthesis
Year 1
Objective 1 Assess hazards
Product: Hazard maps
Objective 2 Assess costs, risks, and actions
Year 1 and 2
Interviews with stakeholders
Property owner surveys
Citizen science
Workshops
Community engagement
Community engagement
Product: Estimated costs and risk, list of actions
All years
Objective 4 Develop an adaptive policy framework
Product: Integrated risk model
Objective 3 Develop an integrated multiple risk model
Year 3
Product: Participatory Scenarios & Adaptive Policy Framework

Objectives: focus on wildfire

- ***Objective 1:*** *Create decadal wildfire hazard maps (1980-2060)*
- ***Objective 2:*** *Assessing pubic and private costs, risks, and actions associated with wildfire and wildfire management*
- ***Objective 3:*** *Integrated multiple hazard assessment that illustrates overlap between risks from wildfire, permafrost thaw, and rain-in-winter*
- ***Objective 4:*** *Develop an adaptive policy framework to help residents, local government, and agencies to manage wildfire and wildfire risks*

Alaska EPSCoR Research Focus

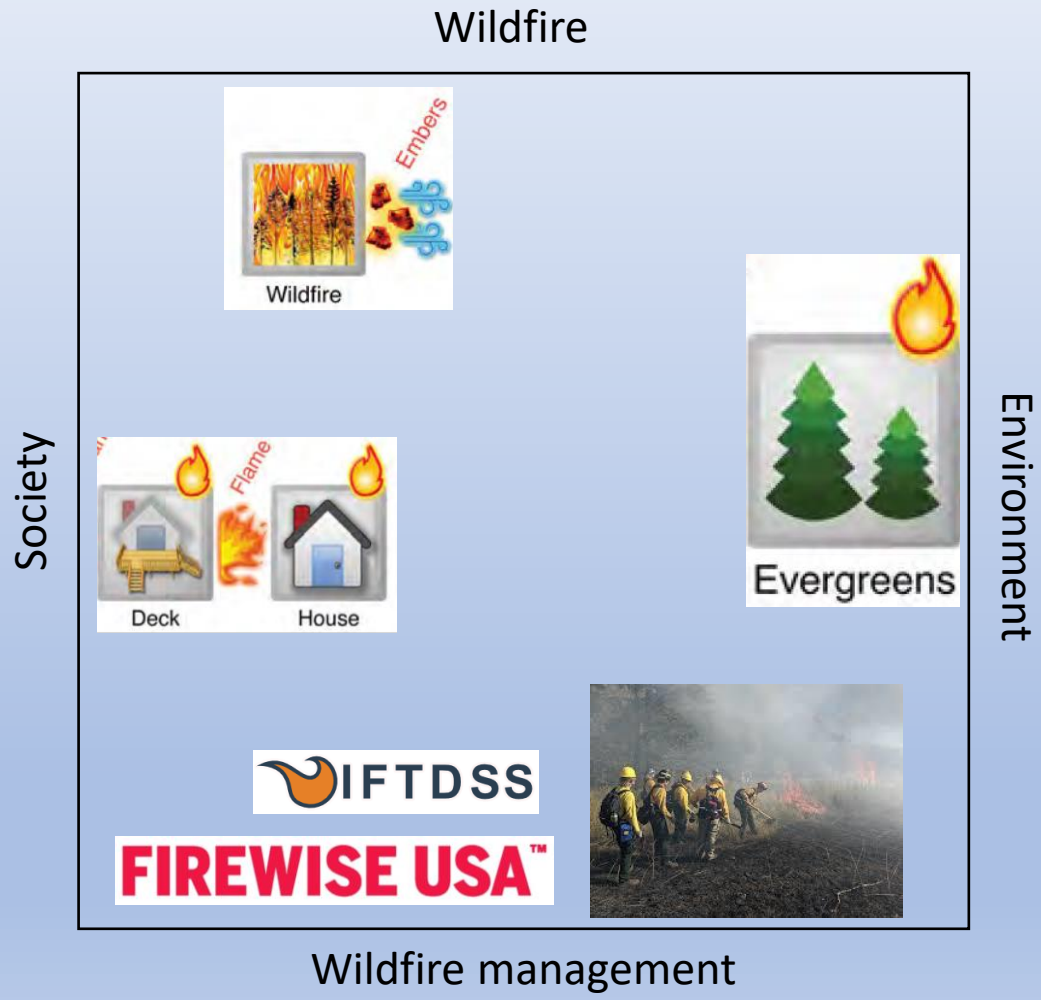
Boreal fire regimes

The goal of the Boreal Fires team is to increase community resilience to wildfire by improving evaluations of subseasonal-to-seasonal fire risk, models of fire spread, and *understanding of fire mitigation strategies and impacts of wildfire on ecosystem services*.

Swan Lake Fire 2019, photo credit: Alaska Fire Service

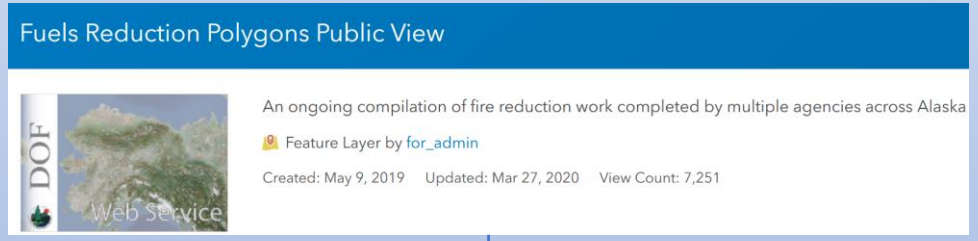
McKinley Fire 2019, photo credit: KTUU & Bill Roth / ADN

Integrative research



Wildfire management: Fuels treatment database

- Goal: build a comprehensive fuels treatment geodatabase for Alaska that is available to wildfire suppression crews to aid their efforts
- Steps
  - Base layer is the division of forestry GIS layer

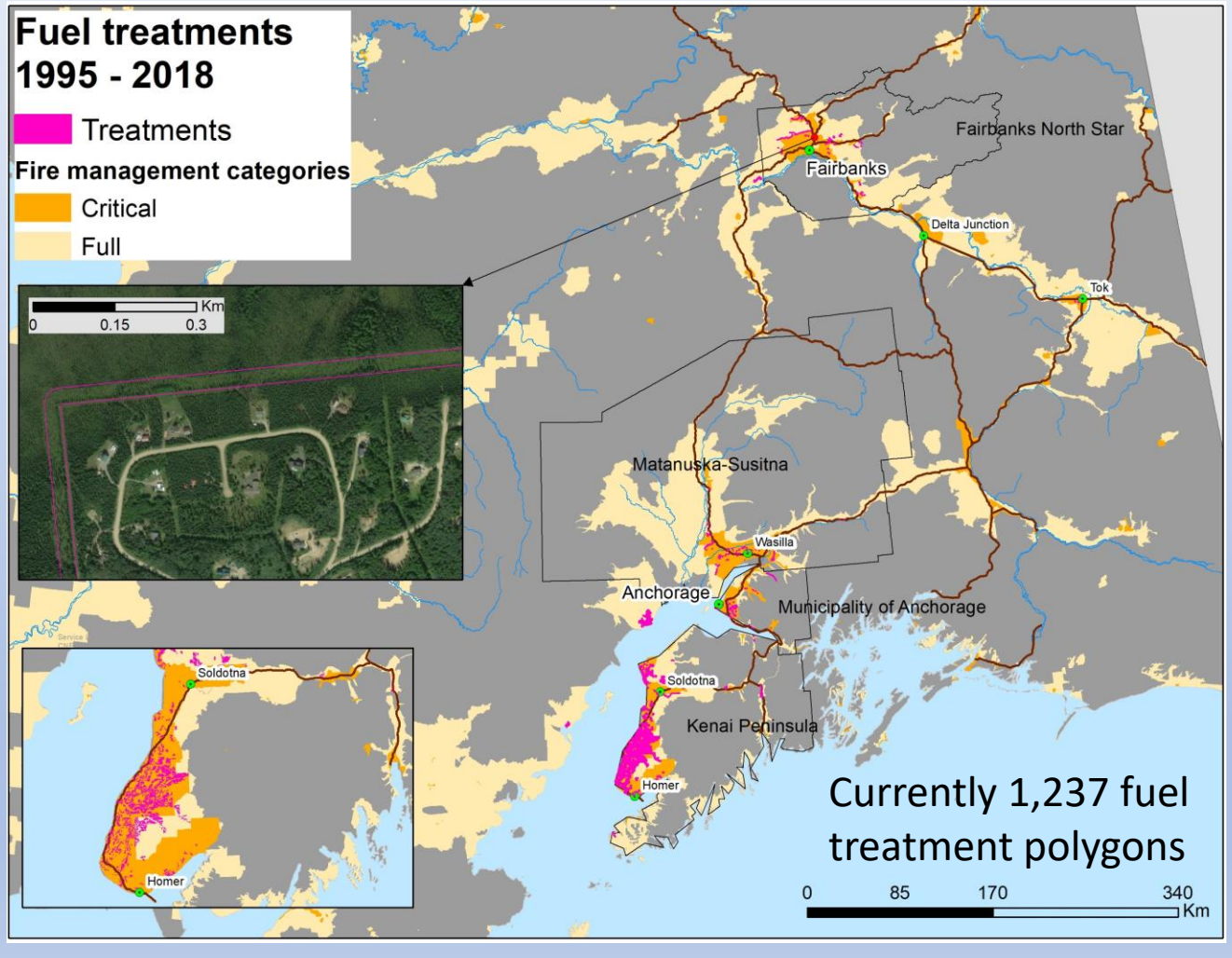


  - Combine with other sources
  - Maintain the relation to the original data
  - Use recent aerial imagery to visualize

Wildfire management: Fuels treatment database

<u>Desired</u> attributes:

Region
Type of treatment
Year of treatment
Visual footprint (yes/no)
Year of aerial imagery
Cost
Source of funding



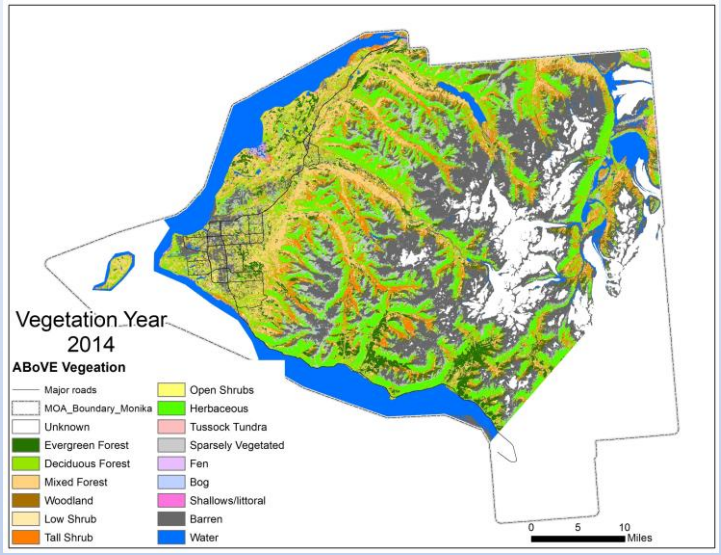
Assessing wildfire hazards over time

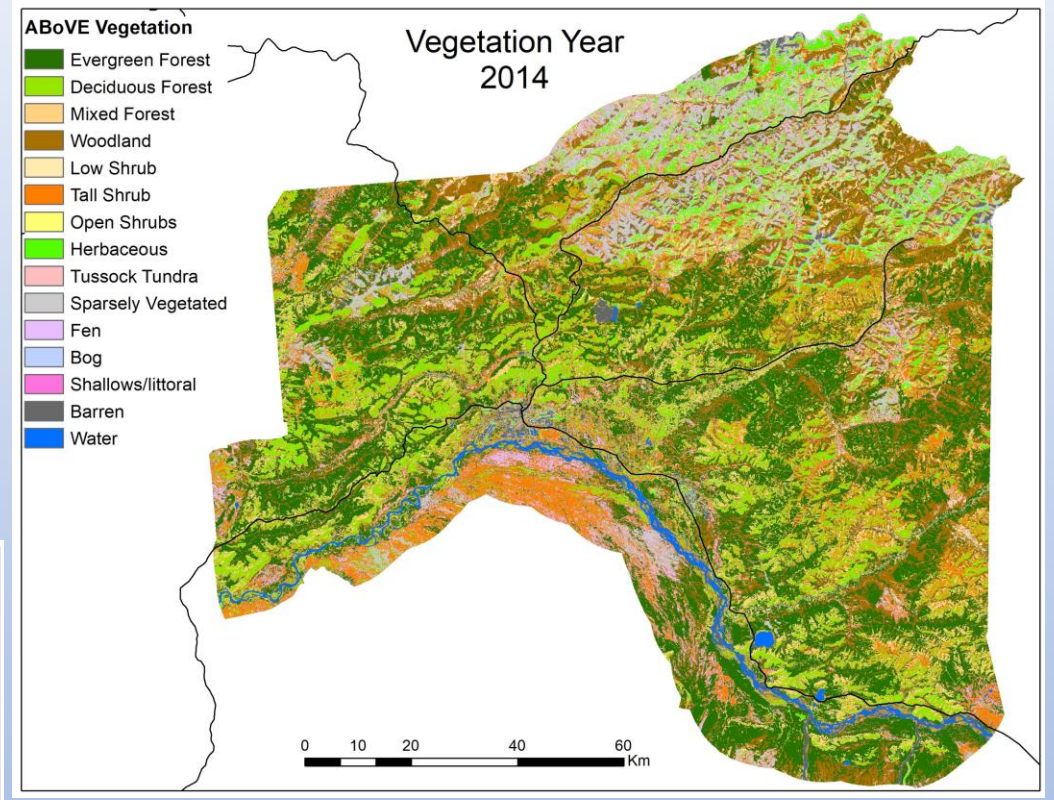
- Main vegetation source:

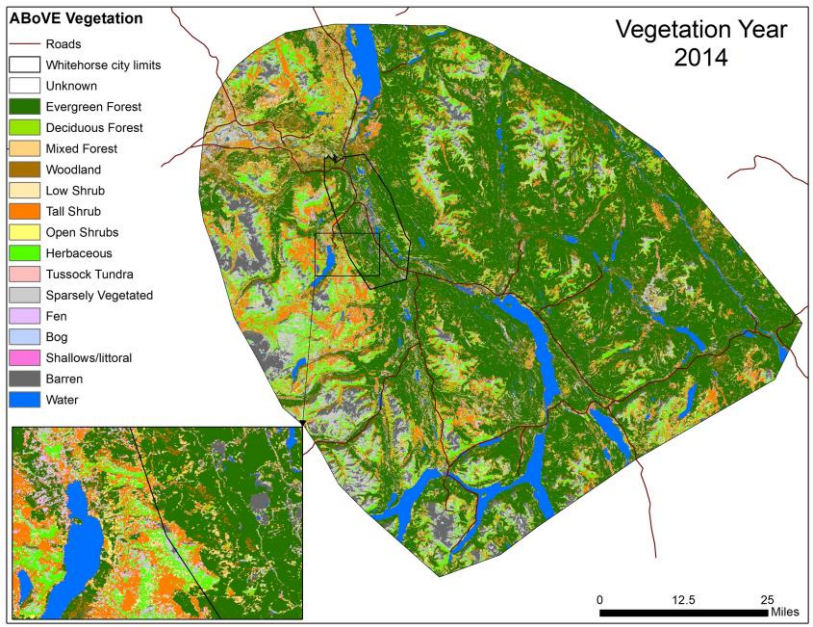
- Wang, J.A., D. Sulla-Menashe, C.E. Woodcock, O. Sonnentag, R.F. Keeling, and M.A. Friedl. 2019. ABoVE: Landsat-derived Annual Dominant Land Cover Across ABoVE Core Domain, 1984-2014. ORNL DAAC, Oak Ridge, Tennessee, USA.
- https://doi.org/10.3334/ORNLDAAC/1691

https://daac.ornl.gov/ABOVE/guides/Annual_Landcover_ABoVE.html

Assessing wildfire hazards over time







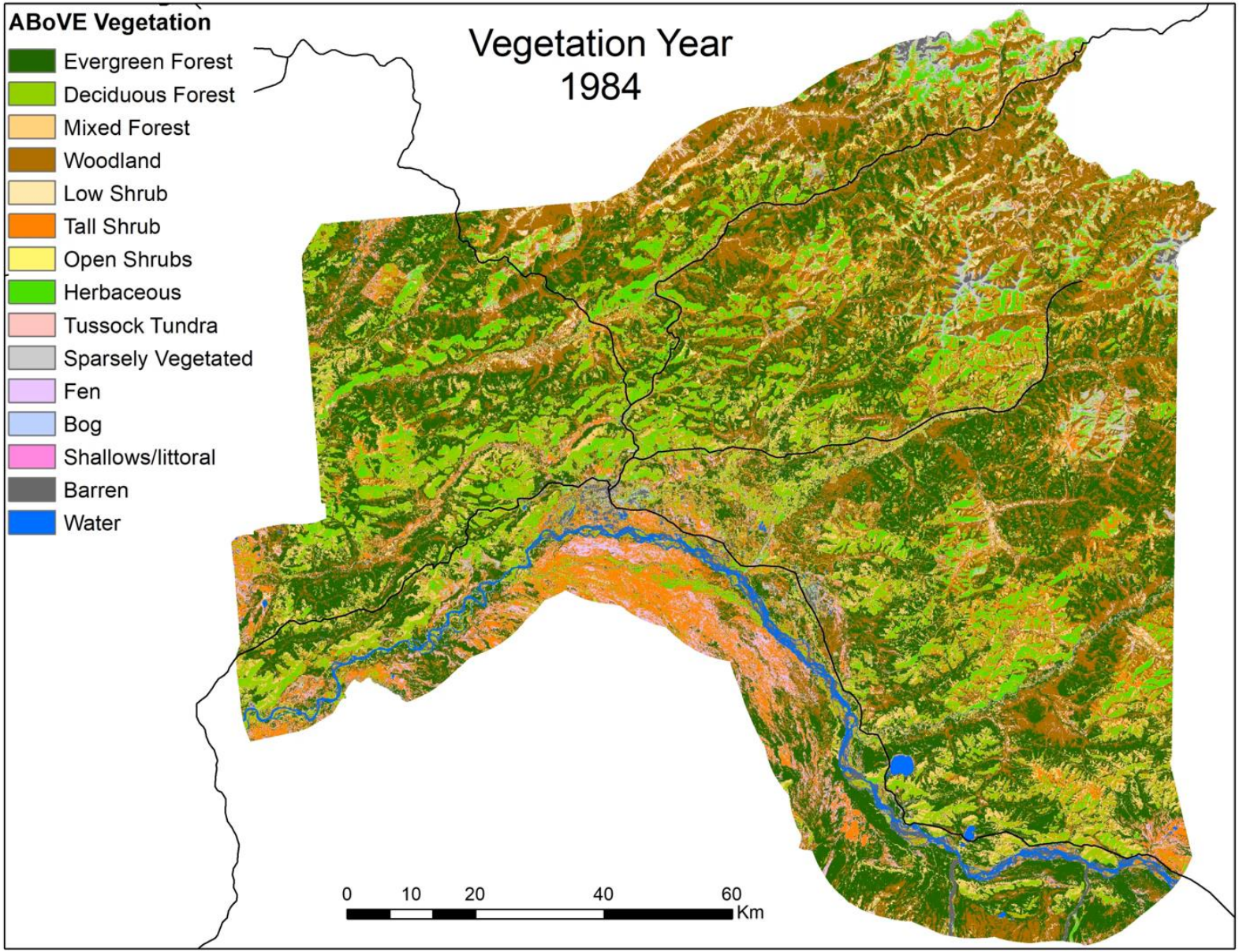
https://daac.ornl.gov/ABOVE/guides/Annual_Landcover_ABoVE.html

How are things changing in Anchorage?

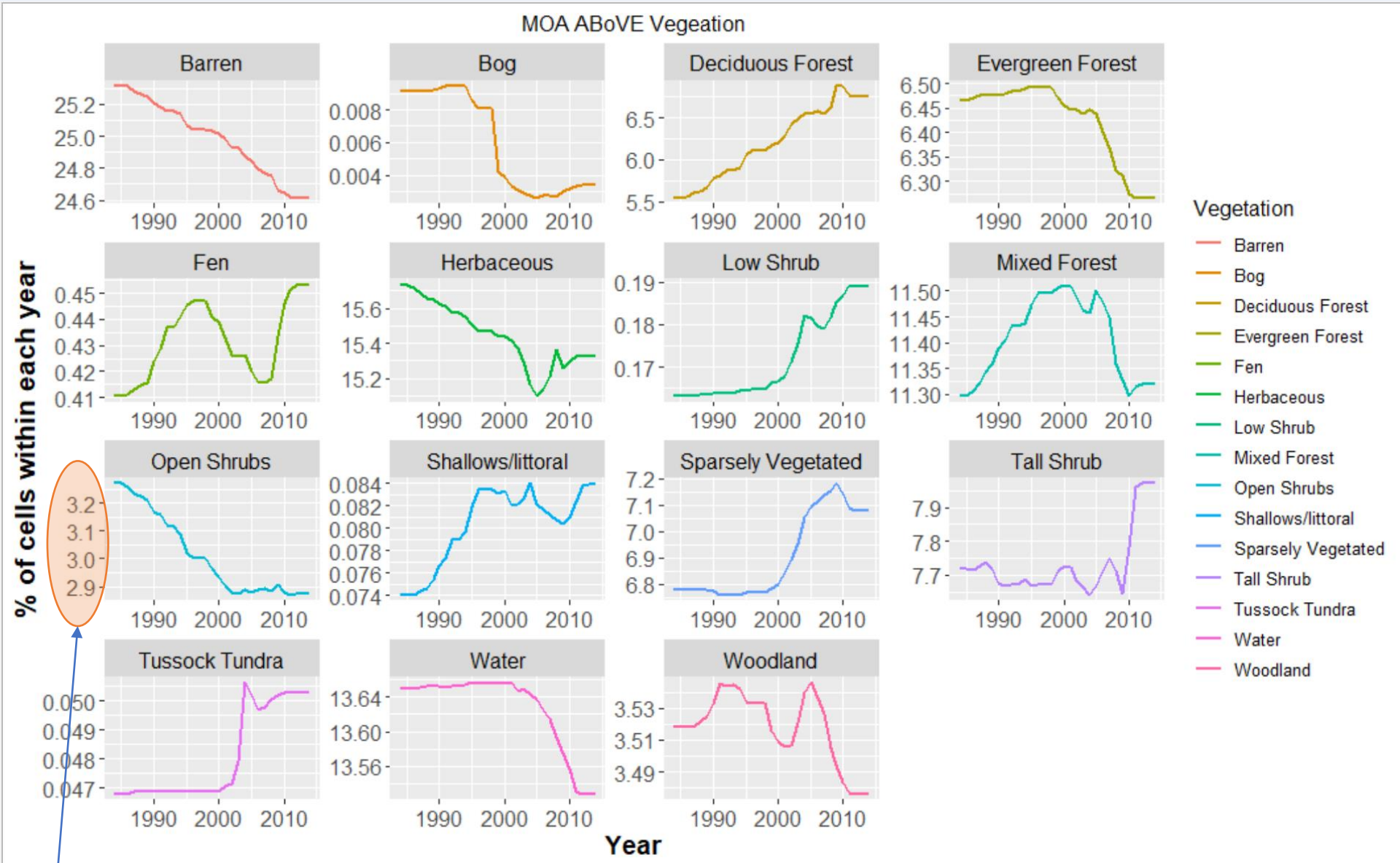
Photo Album

by Jennifer Schmidt

How are things changing in Fairbanks?

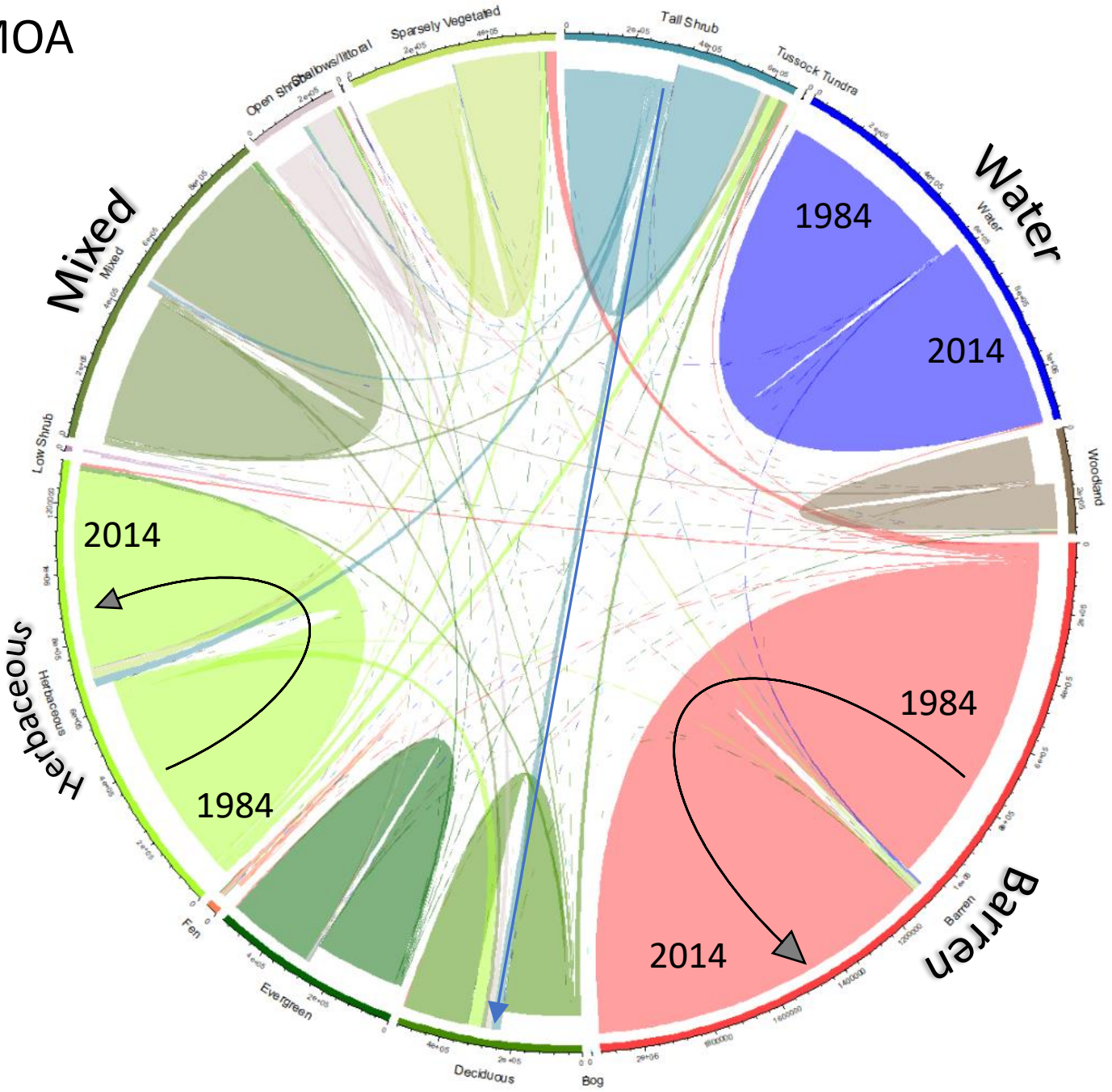


Anchorage vegetation changes over time



These are very small values (< 1%)!

MOA



Key points:
Size of the wedges = proportion on the land

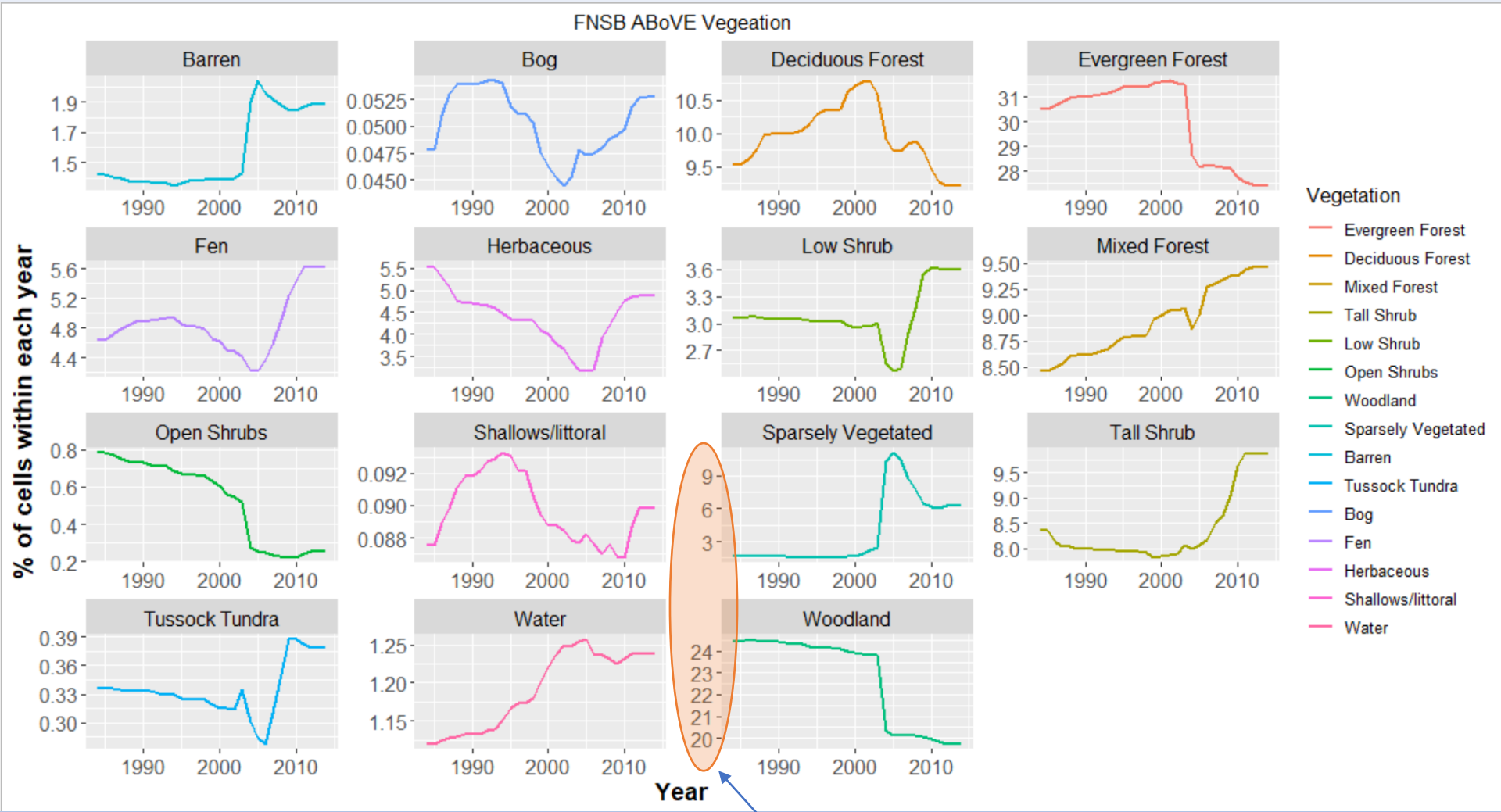
So what is the largest type of "veg"?

Key points:
Inset = 1984
Outer = 2014

Key points:
Lines across the middle indicate a transition

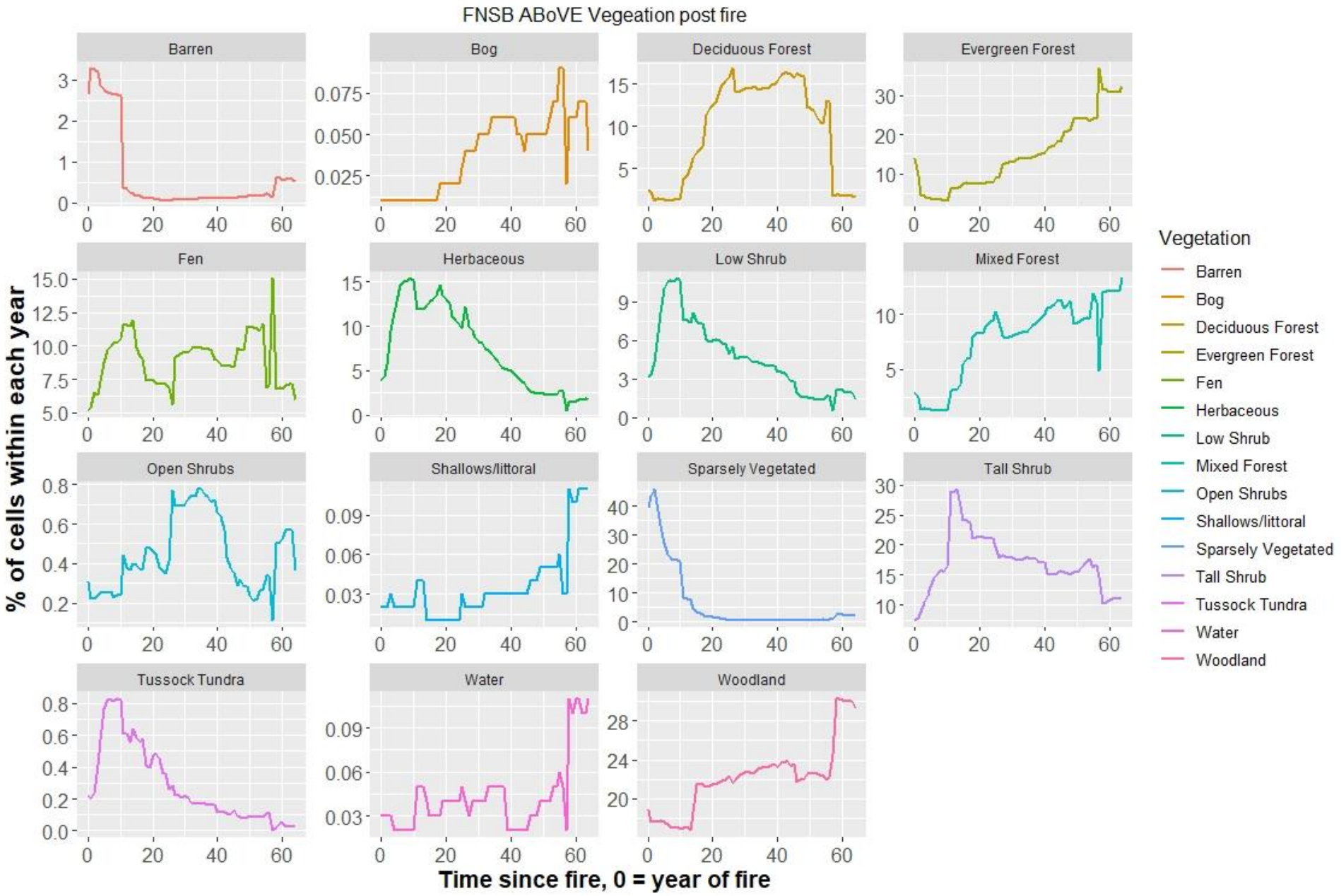
Ex. Tall shrub to deciduous

Fairbanks vegetation changes over time

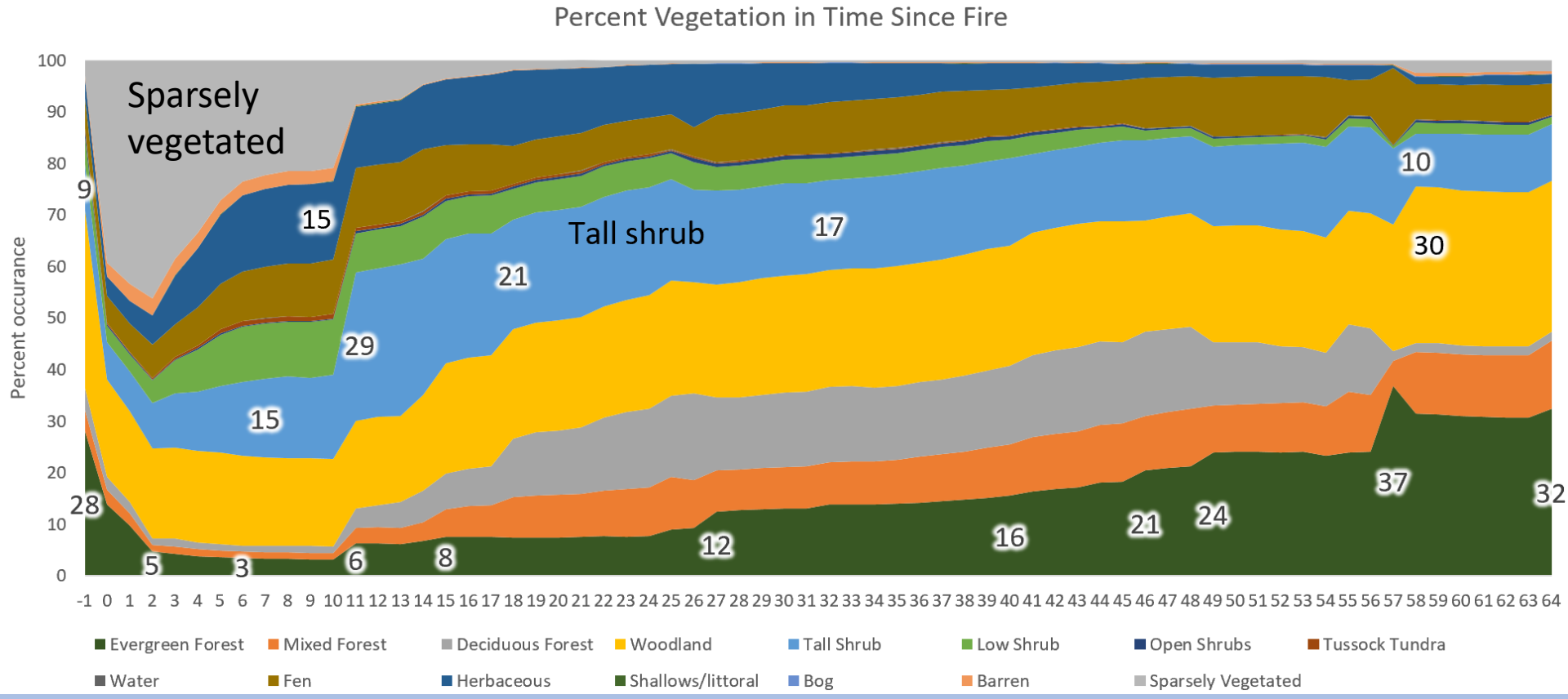


These are larger values (> 1%)!

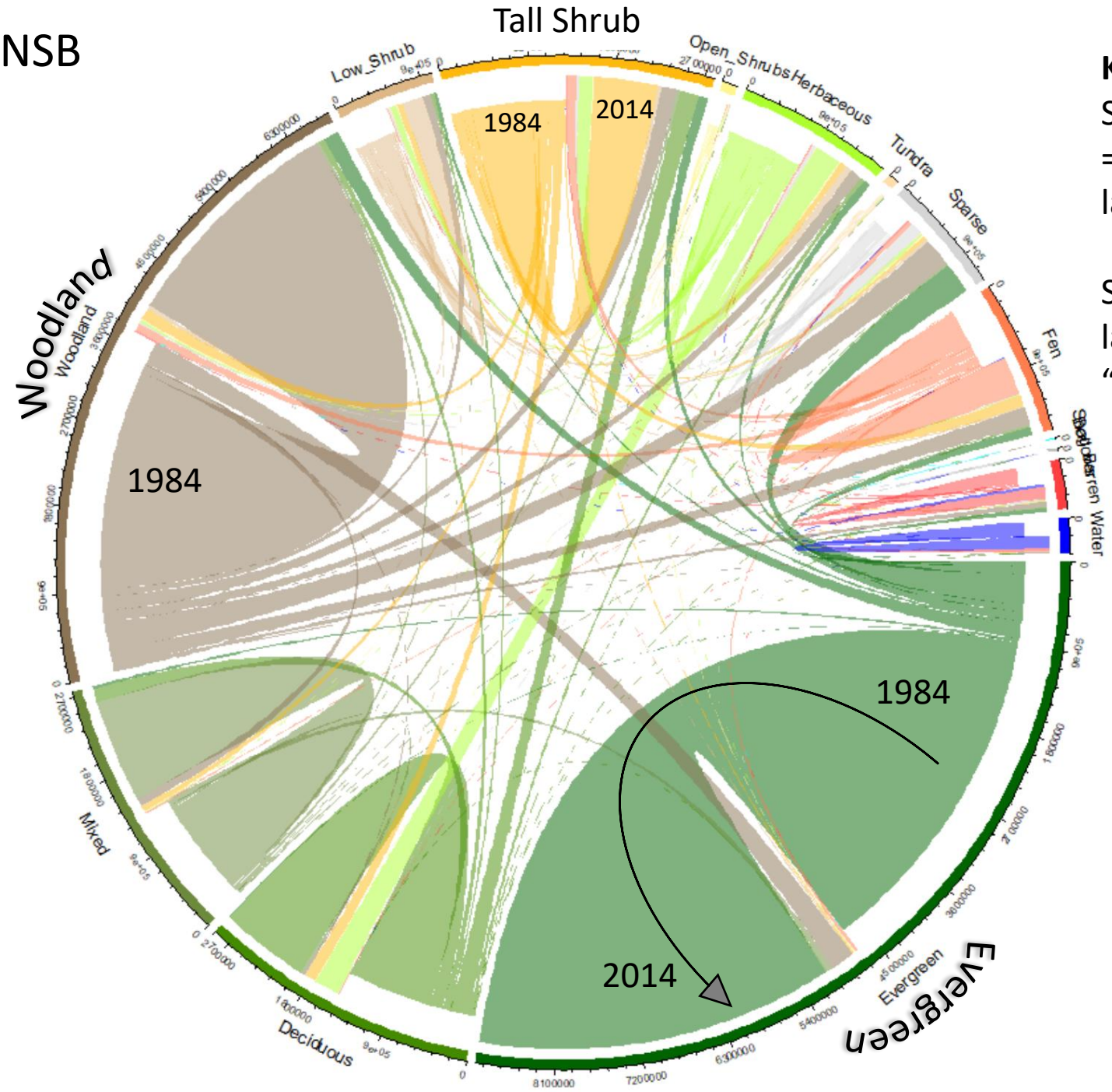
Fire is the key to vegetation changes



From this we can get transition rates to model forward



FNSB



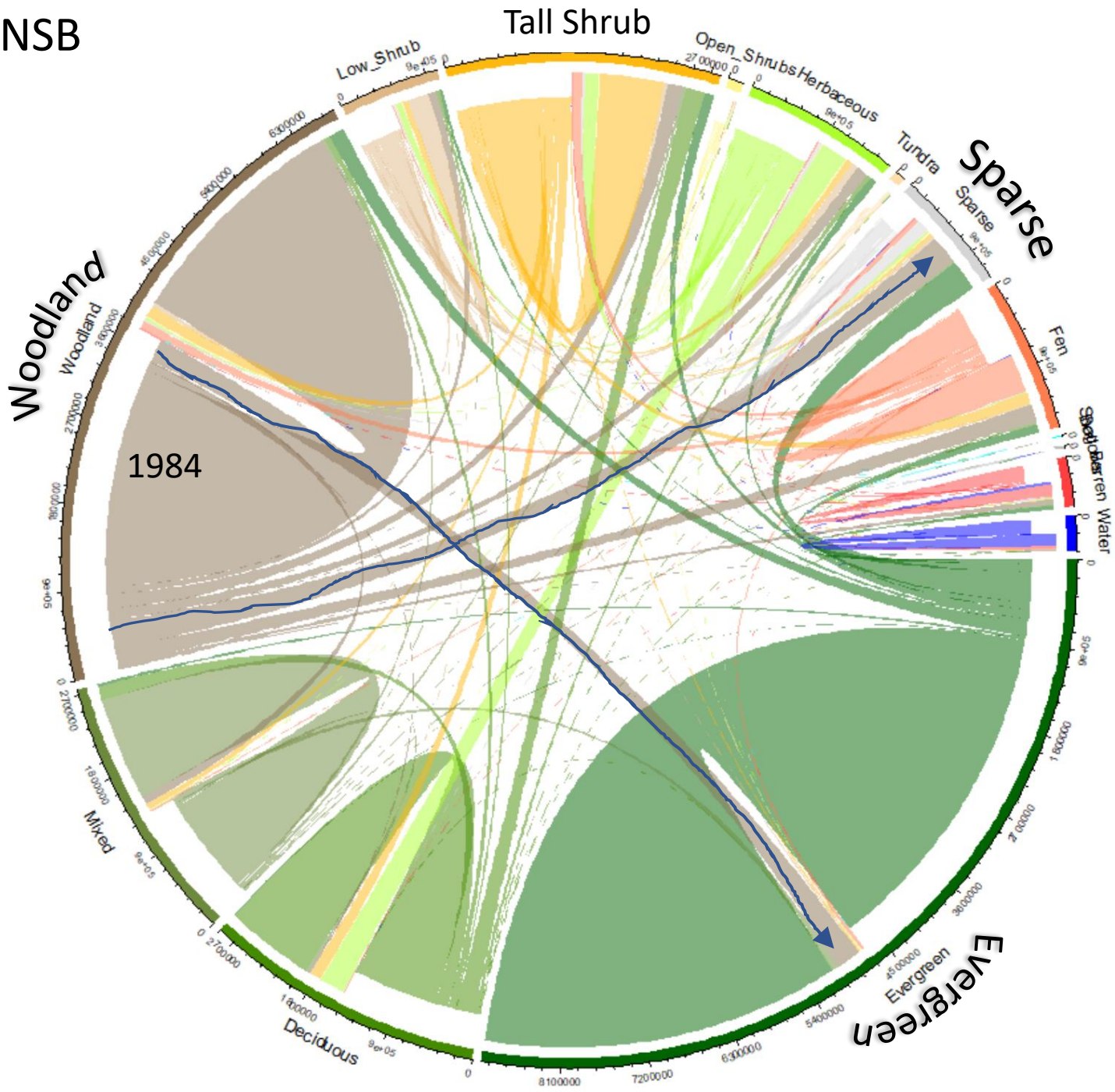
Key points:
Size of the wedges = proportion on the land

So what is the largest type of "veg"?

Key points:
Inset = 1984
Outer = 2014

Tall shrub increased

FNSB



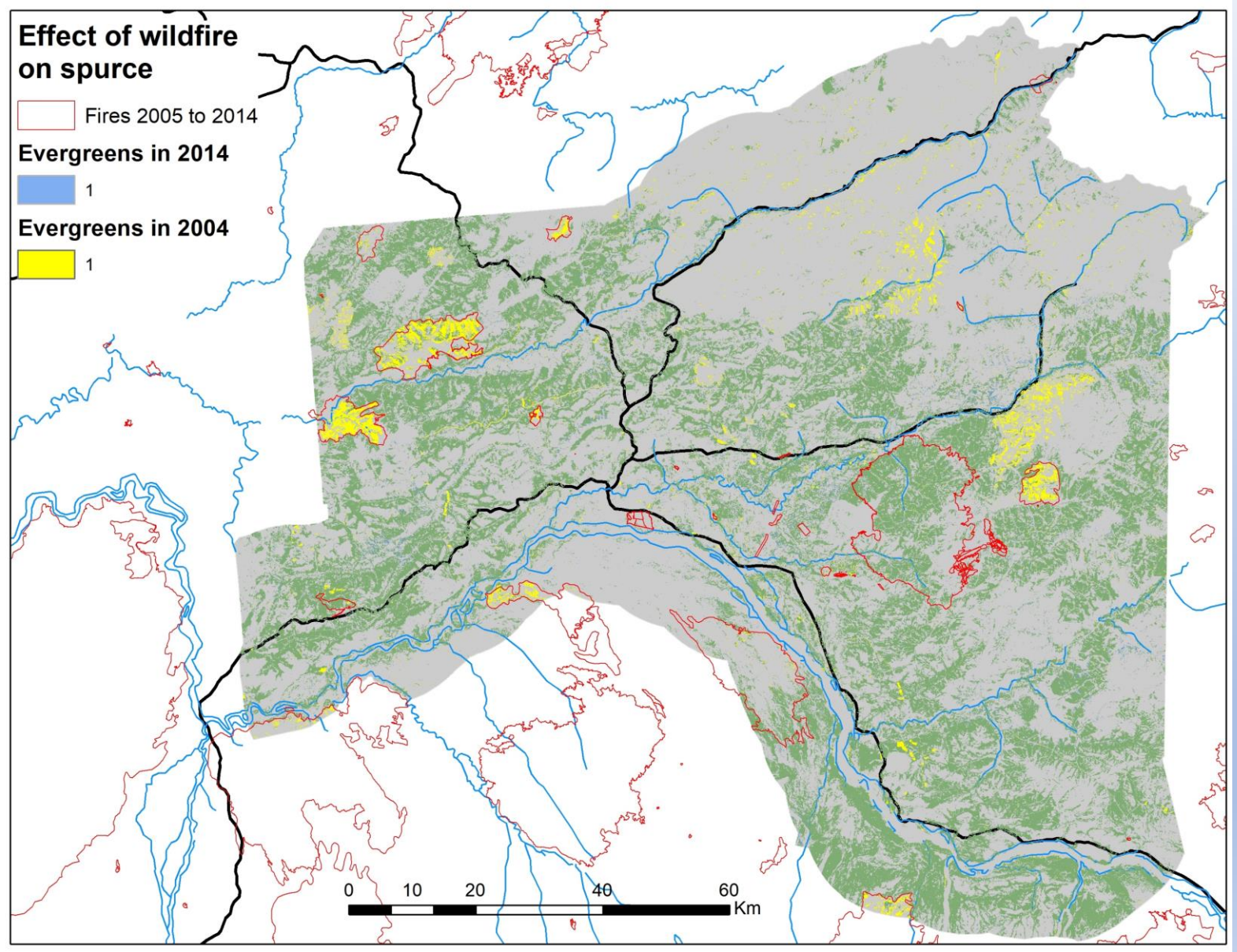
Key points:
Lines across the middle indicate a transition

How does the middle compare with Anchorage?

Key points:
Woodland transitions into many different types of veg

Fire has changed increased deciduous

Targeting spruce for reduction in wildfire risk is certainly good,
ABoVE is pretty good at picking up wildfire effects on vegetation,



Future

- Continue to build fuel treatment and work with the wildfire community to maximize its usfulness
- Alter the ABoVE data to break out the evergreen categories (i.e. black and white spruce, pine, etc.)
- Develop flammability crosswalks
- Use Flammap and deterministic models to assess decadal wildfire hazards
- Gather information to model risk

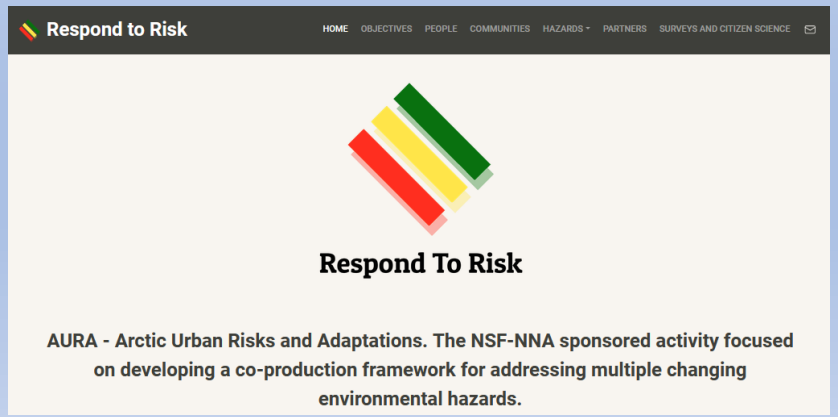
Thank you and Questions

- Zeke Ziel
- NSF #1757348 Fire and Ice: Navigating Variability in Boreal Wildfire Regimes and Subarctic Coastal Ecosystems
- NSF #1927563 Collaborative Research: Arctic Urban Risks and Adaptations (AURA): a co-production framework for addressing multiple changing environmental hazards

UAA Institute of Social and Economic Research
University of Alaska Anchorage

UAF University of Alaska Fairbanks

University of Alaska Southeast



NSF

https://www.respondtorisk.com/